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No. III.

JIB SAILS OF CUTTERS.

The Thanks of the Society were voted to J. PEARSE, Esq. Commander R.N. for his Remarks on the Jib Sails of Cutters; and they were ordered for Publication in the 47th Volume of the Transactions.

Remarks on Cutters' Jibs, explanatory of a proposed Method for cutting them. By Commander JOHN PEARSE, R.N.

NOTWITHSTANDING the art of cutter sailing may be considered as having been brought to great perfection, yet it still has its defects; and there are no sails which require improving more than their jibs, and none more difficult to cut. In fact, it is a matter of chance whether they stand well or not, and on that alone it must depend as long as the present system is followed.

It is most essential that sails in all ships should stand well. In vessels where the requisite quantity of canvass is divided into only a few, it is still more so; and the sailing of a cutter must very materially depend on the standing of the jib, as it is the principal sail which acts against the power of the mainsail.

It is also a great advantage to have a cutter steer and work well under a single-reefed mainsail, foresail, and fourth jib; but which cannot be expected if the jib does not stand well, as she would require too much weather helm, and would not pay off quick enough in stays.

It is well known to old experienced cutter sailors, that jibs, which appear to stand well at first, shew girt after a little wear and a few strong breezes, but not so much in the large as in the smaller or working ones. The cause of the large jibs not girting so soon or so much as the smaller, is, that the fault in them is not, in general, so great, and that they are not set with so much wind; it being the power of the wind, acting on a faulty sail, which produces and increases it.

In all jibs the fault is the same, varying to a greater or less extent, and arises from several causes. The two principal being — first, a very material omission on the part of sail-makers; and, secondly, the part omitted being a most necessary guide in forming the sail.

Although the omission may be considered as the sail-maker's, yet it appears to me, that old experienced cutter sailors, who have made themselves acquainted with the formation of jibs, observed attentively their standing, and the effect of the wind on them, can form a better opinion of what is likely to improve them; and that a person discovering such omission would be assisted by it, and stimulated to a more minute observation.

It is known to all cutter sailors, that jibs low in the clew do not stand well. The cause of it is, the strain of the sheet falls entirely on the foot of the sail, which very soon produces girt, and ruins the sail before it is half worn. It must also be very generally known, that the girt lies across the sail, from the clew to the luff, nearly in a line with the sheet.

Plate XIV. fig. 1, represents a jib with the clew *a* at different heights, and where the strain of the sheet *b* or the line of girt *c* lies. The clew is not, however, represented so low as it may be frequently seen, and the sheet-hole *d* is placed below the sheer plank; commonly it is considerably above, which would cause the strain of the sheet to fall lower than represented in the figure.

Figs. 2 and 3 represent the bows of two cutters, differing in their formations: by which it will be seen, that in fig. 3 the sheets require to lead considerably farther forward than in fig. 2, to form the same angles with the bowsprit, which will also give the sheets much more elevation, and, consequently, cause the strain to fall higher up the sail. It is therefore evident, that the consideration where the sheets ought to lead is of the utmost importance, and the first thing that should be determined on.

Jibs being low in the clew not only causes the strain of the sheet to fall entirely on the foot *e* of the sail, but the leech *f* consequently is too slack, and bags to leeward; it follows that the obliquity of the wind on the sail will be increased by it, and its power lessened.

Although it is generally allowed, that jibs low in the clew do not stand well, yet there are those who consider a slack leech to be an advantage, and that it prevents back sail. But I hardly believe they can also be aware that, on a wind, its obliquity on the sail will be increased by it.

It, however, appears evident to me, that the leech *f* and foot *e* should bear nearly an equal strain; and that when the angle formed by the leech and sheet is smaller than that formed by the foot and sheet, there can be no danger of too much strain falling on the leech, or of back sail, provided the leech is not roped too tight; and that it would materially contribute towards the prevention of girt.

There is, unavoidably, a considerable round or curve in the luff of a cutter's jib, the greatest depth of which is generally placed in the centre, as represented at *g*, in fig. 1. The round gives swell or belly to the sail, and the strain of the sheet lying below that, cuts round under it and causes the girt. In fact, it is produced by a combination of the following causes:—The clew being generally too low, the round in the luff too high, and the sail-maker not considering where the sheets are to lead.

Fig. 4 represents a jib sufficiently high in the clew *a*, and the greatest depth of round *g*, placed in a line with the sheet *b*. It will be seen, that the angle formed by the leech and sheet is smaller than that formed by the foot and sheet; consequently there can be no danger of back sail, or of too much strain falling on the leech.

Such a plan is the most likely to admit of the sail having a regular and uninterrupted swell, and to cause the strain of the sheet, after falling on the clew, to branch off and distribute itself over the whole sail. This is evidently the case in a mainsail, which will support the boom without the aid of the topping lifts, and not strain its leech, which could not be possible if the strain did not distribute itself over the whole body of canvass, the leech rope being very small, and put on slack to prevent back sail. I shall, however, endeavour to explain it more fully by the following example:—

Let fig. 5 be supposed to represent a sail, the sides *a h* and *a i* being equal, and forming equal angles with the line of the sheet *b*. Suppose it to be necessary also to form the side *h i* with a round or curve, it will appear evident, that to give the sail a regular uninterrupted swell, its arrangement should be as represented in the figure; and that if the round was placed higher, the strain of the sheet would cut under it and produce girt.

If it were practicable to form jibs having two sides equal, as represented in fig. 5, the difficulties would be overcome. By adopting such a system, however, too much canvass would be lost, and a considerable space left between the foot of the sail and the bowsprit, as denoted by the dotted line *j*, in fig. 4: consequently, it is not practicable to have a clew high enough to admit of the sheet standing in a line with the greatest depth of round when it is placed in the centre of the luff. It is therefore evident its formation should be guided by the line of the sheet, as represented in fig. 4.

So much depends on the standing of a jib, and such great exactness is necessary in its formation, that it is not only requisite to determine, in the first place, where the sheets are to lead, but to take the required distances with the utmost accuracy. To effect which, the mast should be properly stayed, and the bowsprit placed in the position it would be with a jib set.

Such a system is but very seldom, if ever, put in practice;—sails being frequently made before the vessel is masted, and without the sail-maker ever seeing her: and in the revenue service, it is a common practice to have sails made in London for vessels built and fitted at the out-ports.

In fig. 4, the jib is supposed to be hanging in midships, consequently the clew is lower and further aft than it would be if the sail was swelled by the wind. It is, therefore, necessary to ascertain that position as near as possible, to determine where the greatest depth of round should be placed, which is found by the following method.

In figs. 6 and 7 are drawn the leech *f* and foot *e*, at the angle the sail would stand on a wind: in which will be seen the distance the clew rises, and what it is carried forward. Take, therefore, the leech and foot, less those distances, with compasses, and from *h* and *i*, in fig. 4, describe arcs *k;* the intersection of these gives the position of the clew; through which, from *d*, the place of the sheet hole, draw a line, and it will give the place of the greatest depth of round at *g*.

The proper position for a cutter's mast is perpendicular, or at right angles with the load water-line. This is the opinion of old revenue men, and it has been ascertained by long practical experience. I know it also from my own, in several which I have commanded; and that when the mast-head has gone aft, in consequence of the stay stretching, the vessel has not sailed or worked so well. This is easily accounted for. The foresail being the only sail which acts in casting the vessel in stays, it has more power when the mast is perpendicular than when it rakes aft.

Any alteration of the mast-head, from the place at which the dimensions are taken, puts all fore-and-aft sails out of their proper positions. If the mast is raked, the clew of the jib is lowered, and the strain of the sheet falls too much on the foot of the sail; the distance from the mast-head to the tuffsail will be reduced, and the leech of the mainsail will not sit tight, except by peeking the sail too much, which will cause it to girt in the throat from the gaff to the mast, and also reduce the horizontal distance from the gaff end to the mast, and prevent the gaff-topsail from sitting tight. This is sufficient to prove how necessary it is to be exact in taking dimensions, and that the mast should previously be placed in its proper position.

It is a very common practice, particularly in summer, to set a smaller jib for the night without reefing the bowsprit. The consequence is, more bowsprit is out than sufficient to spread the foot of the sail. Care, therefore, should be taken not to set it too far out, as, by so doing, the clew would be lowered, the strain of the sheet fall too much on the foot, and one night, with a strong breeze, might considerably injure the standing of the sail.

No. IV.

REPEATING STOP FOR A SEXTANT.

The Gold Isis Medal *was this Session presented to Mr. T.* Reynolds, *13, Arbour Terrace, Commercial Road, for a Repeating Stop for a Naval Sextant, which has been placed in the Society's Repository.*

In the sextant, as ordinarily constructed, an observation or angular measurement being made, must be read off and registered before the instrument can be used for a second observation. The only inconvenience attending this, in day observations, is the interval which it necessarily makes between two successive observations. But during this interval clouds may interpose to prevent a second observation; and in all cases where the mean of several successive ones is wanted, the shorter the interval that occurs between them, the more are they to be relied on. In night observations the advantages of expedition are still greater than by day, because the interval between two successive ones is necessarily much lengthened by being obliged to go to a light on deck, or, it may be, in the cabin, in order to read off the result. It is also found, that when the eye is brought from almost